FISHERY DATA SERIES NO. 1

ABSTRACTS FEDERAL AID IN FISH RESTORATION F-10-2, VOLUME 28

By Margaret A. Leonard

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DECEMBER 1987

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By **Margaret A.** Leonard

December 1987

ALASKA DEPARTMENT OF FISH AND GAME
Division of Sport **Fish**
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'This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 *U.S.C.*777-777K) under Projecr F-10-2, Job Number C-1.

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ABSTRACTS

FEDERAL AID IN SPORT FISH RESTORATION

PROJECT: F-10-2 SPORT FISH INVESTIGATIONS OF ALASKA

EFFORT, HARVEST, AND ESCAPEMENT STUDIES

FDS-2 Alaska Statewide Sport Fisheries Harvest Report
by: M. J. Mills

This report presents 1986 findings from an annual survey providing statewide estimates of Alaska sport fishing participation and harvests by fisheries, areas, regions, and species. The survey indicated that 359,383 anglers took 1,650,299 household trips and fished 2,071,412 days to harvest 3,163,433 fish in 1986. The methodology of the survey, based primarily on mailing questionnaires to a sample of licensees, continued to prove effectual.

FDS-3 Sport Effort, Harvest, and Escapement of Coho Salmon *(Oncorhynchus kisutch)* in the Buskin River, Kodiak, Alaska, 1986
by: J. B. Murray

A creel survey conducted on Buskin River 12 August through 2 October 1986 estimated sport anglers fished 20,098 angler-hours and harvested 3,872 adult coho salmon *(Oncorhynchus kisutch* Walbaum). Summaries of the creel survey statistics and biological data for coho salmon sampled from angler creels are presented.

Buskin River fish escapement counts, as determined by foot surveys and a weir operated from 19 April through 2 October 1986, totaled 71 out-migrant steelhead (*Salmo gairdneri* Richardson); 83 inmigrant steelhead; 8,878 sockeye salmon *(Oncorhynchus nerka* Walbaum); 9,492 coho salmon; 52 chum salmon, *(Oncorhynchus keta* Walbaum); and 110,958 pink salmon *(Oncorhynchus gorbuscha* Walbaum). Summaries of weir counts and biological data for fish sampled are presented.

FDS-4 Sport Harvest of Coho Salmon *(Oncorhynchus kisutch)* in Resurrection Bay, Alaska During 1986
by: S. Sonnichsen, R. H. Conrad, E. T. McHenry, and D. S. Vincent-Lang

There were an estimated 5,950 boat-trips of effort in the Resurrection Bay boat fishery from 23 June through 14 September. This fishery harvested 13,107 coho salmon *(Oncorhynchus kisutch* Walbaum). About half the effort (46 percent) and coho salmon harvest (52 percent) occurred during the eleven-day Seward Silver Salmon Derby. In the Resurrection Bay beach fisheries, estimated effort and harvest were 16,708 angler-hours and 2,084 coho salmon, respectively. The majority of harvested

coho salmon were age 1.1 (93 percent) and chinook salmon were age 0.1 males (68 percent).

FDS-6 Harvest of Chinook Salmon (*Oncorhynchus tshawytscha*) and Coho Salmon (O.*kisutch*) and the Lower Kenai River Recreational Fisheries, 1986

by: R. H. Conrad and S. L. Hammarstrom

A creel survey was conducted on the Kenai River between the outlet of Skilak Lake and Cook Inlet from 17 May through 28 September 1986. The recreational fishery in this section of the Kenai River is directed primarily for two species, chinook salmon (*Oncorhynchus* tshawytscha Walbaum) during June and July, and coho salmon (*O. kisutch* Walbaum) during August and September. The estimated angler-effort and harvest during the early (May and June) chinook salmon run were 183,901 angler-hours and 7,561 chinook salmon, respectively. The estimated angler-effort and harvest during the late (July) chinook salmon run were 244,440 angler-hours and 9,004 chinook salmon, respectively. Unguided anglers exerted 76.2 percent of the total effort and took 54.5 percent of the total chinook salmon harvest while guided anglers exerted 23.8 percent of the effort and harvested 45.5 percent of the total.

The estimated angler-effort and harvest during the coho salmon fishery (August and September) were 281,070 angler-hours and 42,574 chinook salmon, respectively. Unguided anglers exerted 84.9 percent of the total effort and took 74.1 percent of the total coho salmon harvest, while guided anglers exerted 15.1 percent of the effort and harvested 25.9 percent of the total. Harvest and catch estimates for sockeye salmon (O.*nerka* Walbaum), pink salmon (O.*gorbuscha* Walbaum), rainbow trout (*Salmo* gairdneri Richardson), and Dolly Varden char (*Salvelinus malma* Walbaum) are also presented.

FDS-7 Catch and Effort Statistics for the Sockeye Salmon (*Oncorhynchus nerka*) Sport Fishery in the Russian River with Estimates of Escapement. 1986

by: D. E. Athons and D. N. McBride

A creel survey was conducted during the 1986 Russian River sockeye salmon (*Oncorhynchus nerka* Walbaum) sport fishery to determine harvest and angler effort. Anglers expended 126,720 hours to harvest 35,099 sockeye salmon during the early run (14 June to 21 July) and 89,780 hours to harvest 30,813 sockeye salmon during the late run (22 July to 20 August). Spawning escapements of 36,195 early and 40,422 late run sockeye salmon were counted through a weir at the outlet of Lower Russian Lake. Early run sockeye salmon were predominantly age 2.3 (43.7%) while late run fish were predominantly age 2.2 (60.5%). Ground counts of spawning sockeye indicated a peak escapement of 15,230 fish in the Russian River below the weir. These fish, in contrast to those migrating above the weir, were predominantly age 1.3 (62.7%).

FDS-8 Harvest, Effort. and Escapement Statistics for Selected Chinook Salmon ***(Oncorhynchus tshawytscha)*** Sport Fisheries in Northern Cook Inlet, Alaska, 1986

by: K. R. Hepler and R. W. Bentz, Jr.

Selected northern Cook Inlet road-accessible and remote chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum) sport fisheries were creel surveyed with roving and direct expansion programs in 1986. Remote streams and the road-accessible Little Susitna River were open to chinook salmon sport fishing 7 days each week while all other road-accessible streams were open to fishing on weekends only. All chinook salmon sport fisheries were closed to fishing on midnight of 6 July 1986.

An estimated 14,306 chinook salmon were harvested in all northern Cook Inlet chinook salmon sport fisheries in an estimated 251,072 hours of sport fishing effort. Anglers fishing the remote streams harvested an estimated 8,988 chinook salmon in an estimated 137,716 hours of effort while anglers fishing the road-accessible streams harvested an estimated 5,318 chinook salmon in an estimated 113,356 hours of effort. The sport harvests of Northern Cook Inlet chinook salmon were dominated by age 1.3 fish. The cumulative observed spawning escapement for Northern Cook Inlet chinook salmon was 54,461 fish.

FDS-12 Tanana Drainage Creel Census and Harvest Surveys. 1986

by: R. A. Clark and W. P. Ridder

From spring 1986 to spring 1987, 16 creel surveys were conducted on the major fisheries of the Tanana drainage. Angler effort, catch rate, and harvest were estimated for 10 of these fisheries. Catch rate was estimated for the other six fisheries. Catch composition and angler demographics were estimated for all 16 fisheries. Fish species sampled during creel surveys include: Arctic grayling Pallas), lake trout ***(Salvelinus namaycush*** Walbaum), burbot (*Lota lota* Linnaeus), rainbow trout (***Salmo gairdneri*** Richardson), landlocked coho salmon ***(Oncorhynchus kisutch*** Walbaum), anadromous chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum), anadromous chum salmon ***(Oncorhynchus keta*** Walbaum), least cisco ***(Coregonus sardinella*** Vallenciennes), humpback whitefish ***(Coregonus pidschian*** Gmelin), and round whitefish ***(Prosopium cylindraceum*** Pallas).

Harvests in the two major grayling fisheries of the Tanana drainage (upper Chena River and Delta Clearwater River) were at historic lows in 1986. Harvests in these two fisheries were 3,326 and 1,701 fish, respectively. Catch rates of spring grayling fisheries were also at record lows in 1986, ranging from 0.65 fish harvested per hour in Piledriver Slough to 0.09 fish harvested per hour in Badger Slough. Catch rates in two major lake trout fisheries (Fielding Lake and Tangle Lakes) averaged from 0.00 fish harvested per hour to 0.11 fish harvested per hour. Relatively high harvests and catch rates were estimated for the major stocked lake fisheries of the Tanana drainage.

FDS-15 Effort and Catch Statistics for the Chinook Salmon *(Oncorhvnchus tshawytscha)* Sport Fishery in the Lower Nushagak River, 1986

by: R. E. Minard

A roving creel survey was conducted on the lower Nushagak River from 16 June through 14 July to estimate sport fishing effort and harvest of chinook salmon *(Oncorhynchus tshawytscha* Walbaum). Over 120 anglers were interviewed during the 29-day sample period to estimate angling effort in hours and catch and harvest rate in fish per hour. An estimated 9,410 angler hours were expended on the lower Nushagak River which resulted in 2,505 chinook salmon landed of which 1,780 (71 percent) were harvested. Seasonal catch rates between guided (0.31 fish per hour) and unguided anglers (0.10 fish per hour) were significantly different ($p = 0.05$). Age 1.3 chinook salmon dominated the harvest (71 percent). Mean length and weight of the harvest was 778 millimeters and 8.4 kilograms, respectively. At present, levels of sport fishing effort and harvest constitute the smallest utilization of all user groups (less than 2 percent).

FDS-16 Fisheries Statistics for Selected Sport Fisheries on the Lower Kenai Peninsula. Alaska, 1986 with Emphasis on Dolly Varden Char *(Salvelinus* malma)

by: D. Nelson, L. L. Larson, and D. T. Balland

Creel surveys of the recreational fisheries on the Anchor River, Deep Creek, and Ninilchik River were conducted from 3 July to 31 October. A survey of angler opinion concerning enhancement options for Anchor and Ninilchik Rivers was conducted concurrently with the creel survey. Maximum seasonal harvest rates (fish harvested per angler-hour of fishing effort) by anglers fishing these systems were 0.0653 for Dolly Varden char *(Salvelinus* malma Walbaum) at Anchor River, 0.1000 for coho salmon *(Oncorhynchus kisutch* Walbaum) at Deep Creek, and 0.0213 for rainbow/steelhead trout (Salmo *gairdneri* Richardson) at Deep Creek. The majority of anglers favored steelhead trout enhancement on the Anchor and Ninilchik Rivers and chinook salmon enhancement on the Ninilchik River. Angler counts were conducted by aerial surveys on each of the systems. The majority of anglers were concentrated in the lower 3 kilometers of each stream. The mean angler count for the Anchor River was 29.2. This was more than four times greater than the mean count for either Deep Creek (6.2) or Ninilchik River (5.7). A total of 79 Dolly Varden char were tagged in the south fork of Anchor River.

FDS-20 Catch and Effort Statistics for the Coho Salmon *(Oncorhvnchus kisutch)* Sport Fishery in the Little Susitna River with Estimates of Escapement. 1986

by: R. W. Bentz, Jr.

Roving and direct expansion creel surveys were conducted at four access sites on the Little Susitna River to estimate angler-effort for and harvest of coho salmon *(Oncorhynchus kisutch* Walbaum). An estimated

6,098 coho salmon were harvested and an additional 993 coho salmon were caught and released in 42,869 angler-hours of effort. Most of the effort, harvest, and catch occurred in the lower portion of the river. Sport anglers using salmon eggs as bait achieved harvest rates three times higher than anglers using artificial lures.

A weir was installed in the Little Susitna River to estimate coho salmon escapement. Total coho salmon inriver return was estimated at 13,097 of which 6,999 escaped the sport fisheries. The estimated hatchery contribution to the inriver return was 6.6 percent.

FDS-21 Harvest Estimates for Selected Sport Fisheries in Southeast Alaska in 1986
by: R. D. Mecum and P. M. Suchanek

Creel surveys of major saltwater and freshwater sport fisheries in southeast Alaska were conducted during 1986. In the marine fisheries, aerial boat counts and dockside angler interviews were used to estimate effort and harvest of salmon, halibut, rockfish, trout, and char. Freshwater roadside and saltwater shoreline effort and harvest estimates were obtained through creel surveys based on completed trip or roving survey designs. For both marine and freshwater fisheries, angler interviews also provided catch rates for selected species by gear type. Scale samples were taken and lengths were measured on chinook salmon (Oncorhynchus ***tshawytscha*** Walbaum) caught by marine anglers and used for age and size composition estimates. The contribution of hatchery and wild stock chinook and coho salmon (Oncorhynchus kisutch Walbaum) to the recreational fisheries was estimated from analysis of coded micro-wire tag recovery data.

An estimated 15,300 chinook salmon were harvested by marine anglers during 1986 in the surveyed fisheries. This compares with approximately 15,000 chinook salmon taken in the same fisheries during 1985 and approximately 12,000 chinook during 1984 and 1983. Chinook and coho salmon catch rates were below average in the Juneau marine fishery, while Ketchikan marine anglers had above average catch rates for chinook, coho, and pink salmon (***Oncorhynchus*** gorbuscha Walbaum). Of the 15,300 chinook salmon harvested in the surveyed fisheries, approximately 20 percent were produced by hatcheries. The largest contributors of hatchery chinook were the Crystal Lake (Alaska Department of Fish and Game, ADF&G), Little Port Walter (National Marine Fisheries Service, NMFS), and Neets Bay (Southern Southeast Regional Aquaculture Association, SSRAA) hatcheries. The majority of hatchery coho salmon were produced by the Whitman Lake and Neets Bay Hatcheries (SSRAA) near Ketchikan.

Chinook salmon CPUE (chinook caught per rod-hour) was compared for those anglers using downriggers versus other types of sport fishing tackle and for anglers trolling versus drifting or anchoring their boats. Anglers trolling for salmon with downriggers had catch rates up to three times higher than did anglers using other types of fishing tackle.

FDS-28 Effort and Catch Statistics for the Chinook Salmon (*Oncorhynchus tshawytscha*) Svort Fishery in the Lower Naknek River. 1986

by: R. E. Minard

A roving creel survey was conducted on the lower Naknek River from 28 May through 25 July to estimate sport fishing effort, catch (fish landed), and harvest (fish kept) of chinook salmon (*Oncorhynchus tshawytscha* Walbaum). An estimated 37,532 angler-hours were expended on the lower Naknek River which resulted in 7,263 chinook salmon being caught of which 6,462 (89 percent) were harvested. Seasonal catch rates between guided (0.26 fish per hour) and unguided (0.07 fish per hour) anglers were significantly different ($P \leq 0.05$). Age 1.3 chinook salmon dominated the harvest (47 percent). The major chinook salmon spawning areas were surveyed from fixed wing aircraft and escapement was estimated at 8,510 fish. Age 1.3 fish dominated (48 percent) the spawning escapement. Males comprised 59 percent of the spawning escapement.

FDS-29 Effort and Catch Statistics for the Sport Fisherv in the Lower Kanektok River, 1986

by: R. E. Minard

A roving creel survey was conducted on the lower 32 kilometers (20 miles) of the Kanektok River from 20 June to 4 September 1986 to estimate angling effort, catch (fish landed), and harvest (fish kept). Approximately 11,900 angler-hours of sport fishing effort were expended which resulted in a total catch of 1,935 chinook salmon (*Oncorhynchus tshawytscha* Walbaum), 481 sockeye salmon (*Oncorhynchus nerka* Walbaum), 5,222 chum salmon (*Oncorhynchus keta* Walbaum), 10,337 coho salmon (*Oncorhynchus kisutch* Walbaum) 4,880 pink salmon (*Oncorhynchus gorbuscha* Walbaum), 4,292 Dolly Varden (*Salvelinus malma* Walbaum), and 2,376 rainbow trout (*Salmo gairdneri* Richardson). Most of the fishing was catch and release as sportsmen harvested only 835 chinook salmon, 34 sockeye salmon, 305 chum salmon, 1,496 coho salmon, 97 pink salmon, 493 Dolly Varden, and 55 rainbow trout. Catch and harvest rates between guided and unguided anglers were significantly different ($P \leq 0.05$). Unguided anglers tended to outfish guided anglers nearly 3 to 2. Age, sex, and size samples are summarized for the sport harvest by species.

FDS-30 Sport Effort. Harvest, and Escapement of Dolly Varden Char (*Salvelinus malma*) in the Buskin River, Kodiak, Alaska 1986

by: J. B. Murray

A creel survey was conducted 24 April through 30 May 1986 to estimate sport effort for and harvest of Dolly Varden char (*Salvelinus malma* Walbaum) in the Buskin River. Sport anglers fished an estimated 4,284 angler-hours and harvested an estimated 4,065 adult Dolly Varden char. Age 5, 6, and 7 fish dominated the harvests of Dolly Varden char. The Buskin River Dolly Varden char migrations were counted through a weir operated from 19 April through 2 October 1986. A total of 40,773

emigrant Dolly Varden char and 24,110 immigrant fish were counted through the weir. The estimate of immigrating fish is incomplete as Dolly Varden char continue to enter the system during the winter.

FDS-34 Abundance Estimates for Chinook Salmon *(Oncorhynchus tshawytscha)* in the Escapement into the Kenai River, Alaska by Analysis of Tagging Data, 1986

by: R. H. Conrad and L. L. Larson

Drift gillnets were used to capture adult chinook salmon *(Oncorhynchus tshawytscha)* in the lower Kenai River for tagging. Tagged fish were recovered during creel surveys of the recreational fishery. The tag release-and-recapture data were used to estimate the number of chinook salmon entering the Kenai River from 17 May to 28 July. Effort and catch data from the gillnets were used to estimate the abundance of chinook salmon from 29 July to 14 August. From 17 May to 14 August, 84,643 chinook salmon were estimated to have entered the lower Kenai River. The abundance of late-run fish (57,563) was more than twice that of early-run fish (27,080). The major age groups of returning chinook salmon were 1.3 (46 percent) and 1.4 (36 percent). The mean length-at-age of male and female chinook salmon increased throughout the return.

FDS-36 Fisheries Statistics for Selected Sport Fisheries on the Lower Kenai Peninsula, Alaska, 1986 with Emphasis on Chinook Salmon *(Oncorhynchus tshawytscha)*

by: S. L. Hammerstrom, L. L. Larson, and D. T. Balland

Baseline statistics are presented for selected lower Kenai Peninsula chinook salmon *(Oncorhynchus tshawytscha* Walbaum) fisheries and escapements during 1986. Escapement surveys were conducted utilizing both ground and aerial techniques on three lower Kenai Peninsula streams. The minimum chinook salmon escapement in 1986 was estimated at 2,830 in the Anchor River, 2,550 in Deep Creek, and 790 in Ninilchik River. The recreational harvest of chinook salmon from these three streams was sampled for age composition. Age class 1.3 (brood year 1982) comprised approximately 70 percent of the recreational harvest of chinook salmon from these three streams.

Effort and harvest were estimated for the Deep Creek and Whiskey Gulch marine sport fisheries. For the Deep Creek fishery, an estimated 151,793 angler-hours were expended in pursuit of chinook salmon and/or Pacific halibut *(Hippoglossus stenolepis* Schmidt). Total harvest of chinook salmon and Pacific halibut was estimated at 3,881 and 18,867 fish, respectively. The recreational harvest of chinook salmon was sampled for age composition, age class 1.3 and 1.4 being the most prevalent. For the Whiskey Gulch fishery, a total of 71,964 angler-hours were expended to harvest 1,544 chinook salmon and 13,222 Pacific halibut.

A creel survey was also conducted for the late run Kasilof River chinook salmon fishery. In the shore based fishery near Crooked Creek, an estimated 11,024 angler-hours were expended to harvest 128 chinook salmon. The harvest by boat anglers was estimated at 186 fish. The majority of the boat effort (82 percent) and the harvest (94 percent) were by guided anglers fishing from non-powered boats.

STOCKING AND ENHANCEMENT EVALUATIONS

FDS-5 Evaluation of Coho Salmon ***(Oncorhynchus kisutch)*** Enhancement in Resurrection Bay, Alaska. 1986
by: R. H. Conrad, S. Sonnichsen, E. T. McHenry, and D. S. Vincent-Lang

In 1986, 72,685 coho salmon ***(Oncorhynchus kisutch*** Walbaum) smolts and 952 sockeye salmon ***(Oncorhynchus nerka*** Walbaum) smolts emigrated from Bear Lake. The majority (84 percent) of the coho salmon smolts were age 1.0. A total of 5,485 adult coho salmon returned to Bear Lake, of which 98 percent were age 1.1. Bear Lake and Seward Lagoon enhanced stocks were estimated to have contributed 12 percent and 13 percent, respectively, to the combined coho salmon harvest by the boat and beach fisheries.

FDS-9 Evaluation of Arctic Grayling Enhancement in the Tanana Drainage during 1986
by: C. Skaugstad and W. Ridder

Since 1983, hatchery and pond reared Arctic grayling ***(Thymallus arcticus*** Pallas) fingerlings have been stocked in the Delta Clearwater River in June, August, September and October. Release times and rearing methods were compared for relative survival and contribution to the sport fishery. Results have been somewhat inconclusive; although Arctic grayling stocked in late September or early October returned to the river in greater proportions than Arctic grayling stocked earlier in the summer.

Two roadside ponds near Fairbanks were stocked with Arctic grayling fingerlings in September 1985. In June 1986, the estimated survival rate of stocked Arctic grayling in one pond was 0.33. The mean growth in length for Arctic grayling stocked in these two ponds over the 10 month period was 40 and 43 millimeters, respectively.

FDS-10 Enhancement Evaluation Techniques for Arctic Grayling ***(Thymallus arcticus)*** in Alaska. 1986
by: A. C. Havens

This research project was initiated to improve stocking practices of hatchery reared Arctic grayling ***(Thymallus arcticus*** Pallus) in landlocked lakes. Two Matanuska-Susitna Valley lakes that contained populations of threespine stickleback ***(Gasterosteus aculeatus*** Linnaeus)

were stocked with 1.24 gram fingerling Arctic grayling. Grayling survival to age 1 was ten percent in Sliver Lake and one percent in Wolf Lake. These survival rates were considerably lower than the 59 percent survival estimated in 1985 for age 1 Arctic grayling stocked as 2.7 gram fingerlings in stickleback-free Canoe Lake.

Two additional lakes containing no threespine sticklebacks were stocked with two size groups of age 1 Arctic grayling (0.017 gram fry and 1.24 gram fingerlings). In these lakes, relative survival from stocking to the following summer was significantly greater for grayling stocked as fingerlings than those stocked as sac-fry.

FDS-11 1986 Lake Stocking Summary Southcentral Alaska
by: A. C. Havens

Approximately 2,306,500 hatchery reared rainbow trout (*Salmo* ***gairdneri*** Richardson) steelhead, Arctic grayling ***(Thymallus*** *arcticus* Pallas), nonanadromous coho salmon ***(Oncorhynchus kisutch*** Walbaum), and non-anadromous chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum) were stocked in 145 lakes and two streams in southcentral Alaska in 1986.

Rainbow trout fingerlings, subcatchables and catchables, comprised 42 percent of the 1986 plant, while 29 percent were Arctic grayling fry and fingerling, 25 percent were landlocked coho salmon fingerling and subcatchables, 2 percent were steelhead smolt, and 2 percent were landlocked chinook salmon fingerling and catchables.

The Anchorage Management Area was stocked with 282,045 game fish, Glennallen received 586,713 rainbow trout and Arctic grayling, Kenai Peninsula lakes were planted with 332,259 fish, the Kodiak area stocked 91,463 rainbow trout and coho salmon, and Palmer area lakes received 1,014,022 game fish.

FDS-22 Sport Harvest and Enhancement Evaluation of Coho Salmon ***(Oncorhynchus kisutch)*** in Western Prince William Sound, Alaska 1986
by: K. J. Delaney, R. Sundet, and K. J. Roth

Efforts to increase sport fishing opportunities in western Prince William Sound were begun in 1978 with the annual stocking of coho salmon ***(Oncorhynchus kisutch*** Walbaum) smolts in Passage Canal, and has been expanded in recent years to include stocking of coho and chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum) fry in western Sound lakes and chinook salmon smolts in Passage Canal. Evaluations of these programs (excluding the chinook salmon smolt stocking) were conducted during 1986. Out-migrating juvenile coho salmon from the 1985 stocking were enumerated and biological data collected from two Surprise Cove lakes and Culross Lake during the spring of 1986. Sampling was conducted in September to evaluate growth of the juvenile salmon stocked in 1986 in the Surprise Cove and Granite Bay lakes. A creel survey was conducted on the Whittier terminal area coho salmon fishery. Shore anglers harvested 2,384 coho salmon during the terminal fishery. Shore anglers

made up the largest percentage of the anglers. Harvest rates were highest from 18 August through *14* September with most of the harvest recorded during the weekdays. Biological data for harvested coded wire tagged coho salmon are presented. Additional information was gathered describing selected characteristics of the anglers and the sport fisheries. Boat anglers were also interviewed regarding their preferences in western Prince William Sound concerning enhancement and management options. Recommendations for future programs in western Prince William Sound are presented.

FDS-24 Evaluation of Enhancement Opportunities for Rainbow Trout ***(Salmo gairdneri)*** and Dolly Varden Char ***(Salvelinus malma)*** Sport Fisheries in Bin Lake. Alaska, 1986
by: A. C. Havens

Morphological surveys were performed on seven lakes in the Big Lake drainage in July and August 1986. Data from these surveys were used to construct bathymetric maps of each lake. In addition, biological surveys were conducted on each of the seven lakes. Rainbow trout (Salmo ***gairdneri*** Richarson) and Dolly Varden char ***(Salvelinus malmo*** Walbaum) were captured in Flat and Mirror Lakes and Lloyd's Pond which are interconnected by short channels at the west end of Big Lake. Rainbow trout, but no char, were captured in Long, Stepan, and Twin Lakes, which drain into Big Lake via Meadow Creek. Gill and fyke nets and minnow traps fished in the seven basins of Big Lake in September and October 1986 captured twelve species of fish including 233 rainbow trout ranging in size from 71 millimeters to *432* millimeters and 48 Dolly Varden char ranging from 178 millimeters to 618 millimeters. Minnow traps fished in Meadow and Fish Creeks in October 1986 captured seven species of fish including 138 rainbow trout. No char were captured.

A stratified random creel survey was conducted at Big Lake for 12 days in December 1986 and 7 days in each January and February 1987. Rainbow trout catch and harvest rates ranged from 0 fish/hour to 0.05 and *0.03* fish/hour, respectively. Catch and harvest rates for char ranged from 0.26 and *0.21* fish/hour, respectively to 0.58 and 0.31 fish/hour, respectively.

Biological and creel data obtained from this study were compared to historical biological and creel data. These comparisions indicate that rainbow trout abundance in the Big Lake drainage has decreased from historical levels whereas char abundance has remained relatively stable.

FDS-31 Tanana Drainage Lake Stocking Evaluations. 1986
by: M. Doxey

This report presents the results of the Region III lake stocking and stocked lakes evaluations performed in 1986. In 1986, a combined total of 1,453,655 rainbow trout ***(Salmo gairdneri*** Richardson), Arctic grayling

Pallas), coho and chinook salmon, ***(Oncorhynchus kisutch*** and ***Oncorhynchus tshawytscha*** Walbaum), sheefish *(Stenodus* ***leucichthys*** Guldenstadt), and Arctic char ***(Salvelinus*** *alpinus* Linnaeus) were stocked into 55 lakes and ponds in interior Alaska. The 1987 request is 1,860,350 fish to be stocked in 47 waters.

A mark-recapture population estimate of rainbow trout stocked as sub-catchables in Birch Lake in 1986 indicated that 57 percent had survived to catchable size. This high survival rate is expected to reverse the declining trends in the sport fishery resulting from poor survival of rainbow trout stocked as fingerlings. A mark-recapture population estimate of rainbow trout and coho salmon was also performed in Quartz Lake. The total abundance of rainbow trout greater than 170 millimeters was estimated at only 10,479 fish, and the abundance of coho salmon was estimated at 21,503 fish.

Netting was performed in some stocked lakes and ponds to evaluate stocking success and growth of stocked fish. Most stocking attempts were successful and sport fishing potential was judged to be increased. No sheefish that were stocked into Harding Lake in 1982 and 1984 were caught during sampling.

FDS-33 Evaluation of Enhancement Efforts for Rainbow Trout, Coho Salmon. and Chinook Salmon in Southcentral Alaska. 1986

by: A. C. Havens, J. B. Murray, K. J. Delaney, and K. J. Roth

Experiments were conducted to provide information for the development of improved stocking practices for hatchery reared rainbow trout (*Salmo* ***gairdneri*** Richardson), coho salmon ***(Oncorhynchus kisutch*** Walbaum), and chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum), in landlocked lakes.

Survival and growth of Swanson River strain rainbow trout were compared with survival and growth of Big Lake strain and Kitoi strain rainbow trout. In all cases, survival of Swanson River rainbow trout was greater than that of the other strains. Growth of Swanson River rainbow trout was variable in comparison to that of Big Lake strain. However, Swanson River strain rainbow trout grew faster than Kitoi strain rainbow trout.

Relative survival of age 1 Swanson River strain rainbow trout planted as fingerling by air-drop method was less than that of similar fish stocked by the standard hatchery tank truck release method. Growth of rainbow trout stocked by the two methods was not significantly different.

Research was conducted on Anchorage-area lakes stocked with catchable rainbow trout to estimate appropriate stocking times and stocking densities. Sport effort and catch rates were highest in the three weeks immediately following stocking, and dramatically declined thereafter.

Survival and growth were compared between coho salmon and chinook salmon stocked as fingerling. In all cases, survival of coho salmon was

greater than that of chinook salmon. However, growth of chinook salmon was superior to that of coho salmon. Nevertheless, the difference in survival was the critical factor and it is recommended that lake stocking of chinook salmon be discontinued.

FM-1 Biological Statistics for Coho (*Oncorhynchus kisutch*) and Sockeye (*O. nerka*) Salmon in Resurrection Bay, Alaska, 1962-1986
by: D. Vincent-Lang

Twenty-five years of statistics on stocking levels, smolt outmigrations and adult escapements, and sport fishing effort and harvests were compiled for coho (*Oncorhynchus kisutch* Walbaum) and sockeye (*O. nerka* Walbaum) salmon in Resurrection Bay, Alaska. Outmigration of coho salmon smolts from Bear Lake has averaged 70,666 from 1965-1986 varying from 0 in 1972 to 143,615 in 1982. The peak of the outmigration historically occurs in late June with 50 percent of the smolts having usually passed the weir by 17 June. The outmigration of sockeye salmon smolts from Bear Lake has averaged 71,645 from 1965-1986 varying from 0 in 1972 and 1973 to 1,083,230 in 1966. Fifty percent of the sockeye salmon smolts have usually passed the weir by 8 June. Age 1 and 2 smolts have been the majority of the coho and sockeye salmon smolt outmigrants from Bear Lake. Fingerling-to-smolt survival rates for coho salmon stocked in Bear Lake have varied from 77.7 percent for the 1965 stocking to 8.1 percent for the 1963 stocking, averaging 34.2 percent for the period 1963-1985. Escapement of coho salmon to Bear Lake has averaged 2,284 from 1961-1986 varying from 0 in 1963, 1971, and 1973 to 5,797 in 1983. The peak of the coho salmon escapement historically occurs in late September to early October with 50 percent of the run usually having passed the weir by 25 September. Escapement of sockeye salmon from Bear Lake has averaged 4,914 over the years 1961-1986 varying from 7 in 1975 to 58,964 in 1968. Fifty percent of the sockeye salmon have usually passed the weir by 24 June. Coho salmon escapements were mostly age 1.1 whereas sockeye salmon escapements were mostly age 1.2 and 1.3. The harvest of coho salmon in the boat fishery from 1968-1986 averaged 15,236 ranging from 22,932 in 1968 to 8,861 in 1976. An average 21.7 percent of the harvest came from enhanced stocks, mostly those from Bear Lake and Seward Lagoon. Although harvest estimates for coho salmon could not be derived for the beach fishery, they are probably much smaller than for the boat fishery. Enhanced stocks from Seward Lagoon are the largest contributors to the beach fishery.

LIFE HISTORY AND STOCK ASSESSMENT STUDIES

FDS-13 Movement, Abundance and Length Composition of 1986 Tanana River Burbot Stocks
by: J. E. Hallberg, R. A. Holmes, and R. D. Peckham

In an ongoing study of burbot Linnaeus) in the Tanana River, a total of 3,541 burbot (greater than or equal to 300 millimeters in

total length) were tagged during 1986. Tag returns obtained from area anglers and from continued sampling since 1983 indicate that burbot move upstream more than downstream after being released. The greatest recorded movement was by a burbot that moved 256 kilometers upstream over a period of 1,244 days.

Sampling was conducted using baited hoop traps during 1986 in subsections of 11 of 14 Tanana River study sections. Catch per unit of effort (burbot caught per hoop trap per net-night) data were collected for an index of burbot abundance. Average catch per unit of effort ranged from a low of 1.16 burbot per net-night near Fairbanks to a high of 20.0 burbot per net-night near Healy Lake outlet.

A mark recapture population estimate of the number of burbot 300 millimeters and greater was conducted in a 6.4 kilometer subsection of the Tanana River near Rosie Creek. The estimated abundance was 2,892 burbot (standard error = 670). The hoop trap catch per unit of effort in this area was low; 1.49 burbot per net-night.

The mean length of burbot sampled in the Tanana River during 1986 was 635 millimeters. Only slight differences in length frequency of burbot between river sections was documented and no clear segregations of burbot by size to specific areas was noted. Female burbot had a larger maximum length and were longer lived than male burbot. Growth rates of male and female burbot were similar.

FDS-14 Stock Assessment and Biological Characteristics of Burbot in Lakes of Interior Alaska During 1986

by: J. F. Parker, W. D. Potterville, and D. R. Bernard

Abundance and/or indices of abundance of burbot, *(Lota lota* Linnaeus), were estimated for populations in 20 Interior Alaskan lakes. Sampling occurred from June into October 1986. Although burbot 300 millimeters (total length) and longer were captured, burbot were not fully recruited to the gear (hoop traps) until they reached 450 millimeters. Abundance of large (fully recruited) burbot estimated with mark-recapture experiments was greatest in Paxson (9,111), Louise (6,990), Moose (2,027), and Tolsona (1,901) Lakes.

Mean catch per unit of effort of large burbot was above 1.00 burbot per 48-hour set for populations in Tyone, Paxson, and Tolsona Lakes. In June large burbot tended to be in the shallows and small burbot in deeper water; by summer, both large and small burbot were at all depths; and by fall both large and small burbot were in shallow water. Mean catch per unit of effort for large burbot was high in June and July, dropped in August and September, and rose in October in most lakes.

Size composition of burbot populations varied widely among lakes with some having no large burbot at all. Recognizing the sex of mature burbot through inpection of gonads proved difficult. No differences in the growth and age of male and female burbot were found. Sex compositions of well-sampled populations were about 50/50 for burbot of

all ages. Parameters in the length-weight relationships for Paxson and Harding Lakes were estimated. Small and big hoop traps caught burbot of the same size in Paxson Lake, although small hoop traps had higher catch rates.

FDS-17 Assessment of Resources in the Gulkana River with Emphasis on Arctic Grayling *(Thymallus arcticus).* 1986
by: K. J. Roth and K. J. Delaney

Adult males comprised 69 percent of all anglers contacted while fishing the Gulkana River from 16 June through 17 August, 1986. Ninety-eight percent of all interviewed anglers were from Fairbanks, Anchorage, or Delta, and anglers released 92.7 percent of all Arctic grayling ***(Thymallus arcticus*** Pallas) caught during the 1986 survey. Arctic grayling caught in the Gulkana River during 1986 were predominantly age 3 and 4 fish. Arctic grayling tagged during May in Poplar Grove Creek redistributed throughout the lower Gulkana River during the summer. Angler effort and catch rates are reported for the survey period for Arctic grayling, rainbow trout (Salmo ***gairdneri*** Richardson) chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum,) and sockeye salmon ***(Oncorhynchus nerka*** Walbaum). Steelhead comprised 18.7 percent of the total subsistence fishwheel catch surveyed in the Glennallen area. Surveyed anglers were opposed to changes on present gear restrictions and a reduction in bag limits for Arctic grayling but favored a reduction in bag limits for rainbow trout.

FDS-18 Coho Salmon Studies in Southeast Alaska
by: A. E. Schmidt

A coho salmon ***(Oncorhynchus kisutch*** Walbaum) research project was continued to determine escapement goals, migration routes, run timing, harvest rates, and areas of harvest for selected index streams in southeast Alaska. Coded-wire tagging of pre-smolt and smolt populations was conducted at Salmon Lake. Population sizes of these groups were estimated. The adult coho salmon escapement to Salmon Lake was estimated by weir and foot surveys.

The estimated total coho salmon escapement to Salmon Lake was 837 adults. The contribution of this stock of coho salmon to the commercial troll fishery was 1,052, or 54.6 percent of the overall annual return. Survival of tagged smolt to adult return was 12.7 percent. All returns of coded-wire tagged fish were from the outer coastal area offshore of Kruzof, West Chichagof, and Yakobi Islands.

Escapement surveys were conducted on 19 additional streams in southeast Alaska. Coho escapement to many of these streams was the lowest ever recorded.

FDS-19 Stock Assessment of the Dolly Varden Char of Kotzebue Sound

by: D. R. Bernard and A. L. DeCicco

Stock assessment of Dolly Varden char, ***Salvelinus malma*** (Walbaum), of the Kotzebue Sound area continued in 1986. Average lengths of char caught in the Wulik River subsistence fishery and in the commercial fishery for chum salmon in Kotzebue Sound were 408 and 622 millimeters fork length, respectively. Immature char were most abundant in the catch of the subsistence fishery, and mature females outnumbered mature males, In the commercial fishery, females dominated the catches; no immatures were observed. Also, females dominated samples from the summer spawning population on the Kugururok River; average length was 614 millimeters fork length for spawners. An estimated 7,176 char were caught in the Wulik River subsistence fishery and an estimated 2,526 in the commercial fishery for chum salmon. Analysis of information from interviews of commercial fishermen indicated that mesh regulations on gill nets might have been effective in protecting char in 1986, but not in most years. Analysis of the same information indicated no possibility of closing subdistricts to protect char without sacrificing catches of chum salmon. During aerial surveys of spawning populations, 527 and 1,232 spawning char were counted in the Kivalina and Wulik Rivers, respectively. During aerial surveys of overwintering populations, 5,030 and 5,590 char were counted in the Kivalina and Wulik Rivers, respectively. Inclement weather hampered surveys of spawning and overwintering char, especially of spawning char in the Noatak River.

FDS-25 Abundance and Size Composition of Chatanika River Least Cisco and Humpback Whitefish with Estimates of Exploitation by Recreational Spear Fishermen

by: J. E. Hallberg and R. A. Holmes

Mark-recapture experiments, side-scan sonar, and visual counts of passing fish were methods used to estimate abundance of whitefish in the fall spawning migration in the Chatanika River during 1986. Total estimated run strength was 87,912 and 92,038 whitefish from the mark-recapture experiments and from expansions of counts made from towers, respectively. No abundance estimate was obtained using sonar because of difficulties distinguishing upstream versus downstream migrating whitefish. An estimated 83 percent of the run was composed of least cisco with the other 17 percent being humpback whitefish. Estimated rates of exploitation by the recreational spear fishery were 0.218 to 0.227 for least cisco and 0.159 to 0.170 for humpback whitefish. Operations were hindered by a flood on 11 October.

FDS-26 Abundance and Length Composition of Selected Grayling Stocks in the Tanana Drainage During *1986*

by: R. A. Clark and W. P. Ridder

Arctic grayling, *(Thymallus arcticus* Pallas), were captured by electrofishing, seining, fyke trapping, and weir trapping in seven river systems and two lake systems of the Tanana drainage of interior Alaska in *1986*. In four of these systems, population abundance was estimated for a whole system or specific sections of a system. Population estimates ranged from *61,581* Arctic grayling greater than 150 millimeter fork length in the Chena River to *410* Arctic grayling in a *4.8* kilometer section of the Goodpaster River system. There was a continuing trend towards declining population size of Arctic grayling in the river systems of the Tanana Drainage. A first ever population estimate of Arctic grayling in a lake system in Alaska was performed at Fielding Lake. There were *6,578* Arctic grayling greater than *200* millimeter fork length in Fielding Lake during *1986*.

Age composition of Arctic grayling in the runoff rivers of the Tanana drainage were similar. The *1983* (age *3)* and *1980* (age *6)* year classes comprised the bulk of the stock in these river systems. Predictions of year class strength from observed river discharge during the natal year are discussed in relation to implementation of special sport fishing regulations. Based on fyke net catch rate in Mile One Slough of the Delta Clearwater River, there will be weak recruitment to the wild stock *1984* and *1985* year classes during the next two years.

FDS-*27* Northern Pike Abundance and Composition Study

by: R. Peckam and D. R. Bernard

Northern Pike (Esox *lucius* Linnaeus) populations in Volkmar, Tee, and George Lakes near Delta Junction, Alaska were sampled in *1986* with gill nets, trap nets, and seines. Estimates of abundance from recapture experiments were *4,026* and *454* northern pike ≥ 450 millimeter fork length in Volkmar and Tee Lakes, respectively. Analysis of tag returns indicated that gill nets caught larger northern pike while trap nets and seines caught the same-sized northern pike, but smaller fish than those caught in gill nets. Gill nets were demonstrably selective for larger fish. Catchability coefficients for panels of different mesh sizes in experimental gill nets were calculated for Volkmar and Tee Lakes. Parameters for length-weight, length-at-age, and weight-at-age relationships were estimated for data collected in *1986* and in previous years. Estimates of sex composition and average growth by individual fish are given. More northern pike were captured in seines and released alive than were caught and released alive in either gill nets or trap nets. Capture rates of northern pike dropped dramatically for all gears after early June.

FDS-32 A Study of Chinook Salmon in Southeast Alaska
by: D. J. Hubartt and P. D. Kissner

The 1986 observed escapement of 18,206 chinook salmon ***(Oncorhynchus tshawytscha*** Walbaum) into the 11 index systems monitored annually in southeast Alaska was 12.9 percent over the escapement goal of 6,850 in index systems from the Stikine River south, but was 39.2 percent below the goal of 17,225 in index systems north of the Stikine River to Yakutat. In the transboundary rivers, chinook salmon index escapements during 1986 increased over 1985 levels in the Taku (+12 percent) and Alsek (+90 percent) Rivers, but decreased in the Stikine River (-22 percent). Escapements to the four Behm Canal index systems (Unuk, Chickamin, Keta, and Blossom Rivers) continued the pattern of good returns experienced since 1982, and management escapement goals were achieved.

Coded wire tag returns from chinook salmon tagged as juveniles indicate that most Taku River and upriver Stikine River chinook salmon rear offshore and are mostly available to southeast Alaska fisheries during the spring of their final year of life as they migrate towards the spawning grounds, while Chickamin and Unuk River chinook salmon are available to Southeast fisheries throughout their marine life history.

In the spring of 1986, 5,932 age 1 chinook salmon smolts were tagged in the Unuk River, 4,435 in the Chickamin River, and in the fall, 5,221 age 0 chinook were tagged in the Alsek River to determine their migration patterns, areas and timing of harvest, exploitation rates, and other general life history information. An additional 8,693 coho salmon smolts ***(Oncorhynchus kisutch*** Walbaum) were captured incidentally, adipose clipped, and micro-wire tagged in the Unuk and Chickamin Rivers.

FDS-35 Stock Assessment and Biological Characteristics of Lake Trout Populations in Interior Alaska, 1986
by: J. M. Burr

This study was initiated in 1986 and was designed to evaluate and monitor the structure of lake trout, Salvelinus ***namaycush*** (Walbaum), populations in interior Alaska and determine the effects of sport fisheries on lake trout stocks. Estimates of catch per unit effort (lake trout caught per hour) from interviews of fishermen ranged from 0.06 to 0.16 fish per hour. Gill nets, fyke nets, and a beach seine were evaluated to determine their relative effectiveness at capturing lake trout unharmed. Small mesh gill nets (25 millimeter and 38 millimeter square measure) were the most effective gear tested. Fyke nets were effective at capturing lake trout less than 200 millimeters fork length in Sevenmile Lake. Beach seining was not effective at capturing lake trout in any of the areas tested. Abundance of lake trout was estimated at Glacier Lake in the upper Delta River System. The density of lake trout over 200 millimeters fork length in this 172 hectare lake was estimated at 15.6 fish per hectare.

Size of lake trout varied widely between sample lakes. The largest fish (maximum fork length greater than 800 millimeters) were found in Paxson and Summit Lakes (Copper River Drainage). Maximum length of fish in each of the other study lakes was generally less than 650 millimeters and all lake trout sampled in Sevenmile and Twobit Lakes were less than 500 millimeters. The oldest lake trout sampled was 36 years old from Summit Lake. Although fish greater than 20 years old were not uncommon, the majority of lake trout sampled were between 4 and 20 years old. Age at maturity (AM_{50}) ranged from 5 for males in Paxson Lake to 12 for females in Twobit Lake. Males typically matured one year earlier than females. Lake trout length at maturity (LM_{50}) ranged from 247 millimeters at Twobit Lake to 425 millimeters at Paxson Lake.

FM-3 Review of Sheefish (*Stenodus leucichthys*) Studies in Alaska

by: K. T. Alt

This paper summarizes knowledge obtained through 22 years of study of Alaska sheefish. Nine stocks of sheefish (inconnu) (*Stenodus leucichthys* Guldenstadt) have been described in Alaska from the Kuskokwim River system north to the Kobuk-Selawik River. The Kuskokwim, Lower Yukon, Koyuk, and Kobuk-Selawik River sheefish are estuarine anadromous while resident nonanadromous stocks occur in the Yukon River tributaries of the Nowitna, Minto Flats (Tanana River), Porcupine, Salmon Fork of the Black, and upper Yukon Rivers.

Anadromous sheefish of the Kobuk-Selawik, Lower Yukon, and Kuskokwim Rivers are more abundant and individual fish reach larger maximum sizes than fish of nonanadromous stocks. Minto Flats and Kuskokwim River sheefish grow faster than fish from other areas, reaching 6.4 kilograms and 810 millimeters by age 10. Kobuk-Selawik River fish live considerably longer than fish from other stocks reaching maximum ages of 21 years and maximum weights of 25.5 kilograms. Age at first maturity of Alaska sheefish ranges from a low of age 4 to 8 for males and 7 to 9 for females of the Kuskokwim River stock up to age 7 to 9 for males and 9 to 12 for females of the Kobuk-Selawik stock.

Sheefish generally overwinter in lower reaches of rivers and estuarine waters, migrate upstream in summer to feeding grounds, and migrate further upstream to spawning grounds in the late summer and fall. Migrations of over 1,600 kilometers have been documented. Sheefish spawn in late September and early October at water temperatures of 0-5 degrees Celsius. They are broadcast spawners and spawn only in late afternoon and evening. Numbers of spawners range from 100 in the Chatanika River to 3,700 in the Kobuk River. Spawning grounds have been identified for all major sheefish stocks. Availability of spawning habitat with desired current (2 meters per second), water depth (2 meters), and bottom substrate of differentially sized gravels may be the most critical factor limiting sheefish distribution and abundance.

Adult sheefish are mainly piscivorous and whitefish (*Coregonus* sp.), Arctic lampreys (*Lampetra japonica* Martens), and longnose suckers (*Catostomus catostomus* Forster) are important food items. Feeding

sheefish in the upper Yukon and Holitna Rivers seasonally prey heavily on fingerlings of chum salmon *(Oncorhynchus keta* Walbaum), coho salmon **(O.***kisutch* Walbaum), and chinook salmon (*O. tshawytscha* Walbaum).

Sheefish are harvested by subsistence, commercial, and recreational users with subsistence harvests exceeding all others. The major commercial fishery (Kotzebue Sound) has a harvest quota of 1,136 kilograms or approximately 3,300 fish yearly. Statewide recreational harvest has ranged from 1,250 to 3,950 fish from 1977-1985.

Sheefish have been experimentally stocked in landlocked lakes and ponds along the road system in the Tanana River drainage. In general, survival of stocked sheefish has been poor. Hatchery rearing techniques for sheefish fingerlings have improved in recent years, however a consistent source of viable eggs and poor growth and survival of stocked fish continue to be the major limitations to a successful large scale enhancement program.

BIBLIOGRAPHIES

FM-4 An Annotated Bibliography of Burbot *(Lota lota)* with Emphasis on Studies Conducted on Northern and Alaskan Burbot Stocks
by: G. Pearse

In response to greatly increased sport harvest of burbot *(Lota lota* Linnaeus) in Alaska, the Department of Fish and Game initiated research on the naturally occurring burbot stocks in interior and southcentral Alaska. To clarify the status of present knowledge of burbot biology, a worldwide literature search on the genus *Lota* was performed. This bibliography is the result of that literature search. A total of 599 primary and secondary references were obtained using several computer literature search facilities as well as library searches. References available after May, 1987 are not included in this bibliography. Since the major focus of this bibliography was to review burbot population biology, fisheries, and life history information, many references dealing only with biochemical research were omitted. Key words are listed for each reference, and a key word index is presented. A short annotation is also provided for each article that the author reviewed.

FM-5 Synopsis and Bibliography of Lake Trout *(Salvelinus namaycush)* in Alaska
by: J. M. Burr

This report reviews literature from studies conducted on lake trout ***(Salvelinus*** *namaycush* Walbaum) in Alaska. Lake trout are distributed throughout high elevation lakes of the Brooks Range, the Arctic coastal plain, the upper Tanana, Susitna, and Copper River drainages, and the Kenai Peninsula. Otoliths are preferred over scales for age determination. Lake trout are long-lived with maximum ages in excess of 25 years common and ages in excess of 50 years recorded. Lake trout tend to grow

slower, mature at older ages, and reach greater maximum age in Arctic populations than in more southerly Alaskan populations. Age at maturity for southern and interior Alaska lake trout is 7 to 8 years compared with 10 to 20 years in northern Alaska. Additional knowledge of the life history, habitat requirements, and population dynamics of Alaskan lake trout is generally lacking.

Statewide lake trout sport harvests have averaged about *19,000* fish annually since 1977 with more than *50%* of the harvest coming from lakes in the Glennallen area and Tanana River drainage. Harvest estimates from almost all accessible lakes are higher than levels recommended to provide sustainable yields. Research with the goal of documenting lake trout abundance and estimating population dynamic rates in Alaska should be conducted and management options to reduce the harvest of lake trout in accessible waters should be considered.

ANGLER PREFERENCES

FM-2 Profiles and Regulatory Preferences of Tanana River Drainage Sport Fishermen
by: R. A. Holmes

Catch rates, fish size, and fish population abundance have declined in many interior Alaska roadside fisheries. A variety of management options to improve stock structure of these fisheries could be implemented. In many cases, different management options would yield similar effects on the fish population. In these instances, it is prudent to choose that option most palatable to the angling public. Also, delineation of management objectives for recreational fisheries often involves more than simple optimization of catch related variables. Motives for fishing, angler descriptions, and angler preferences for a variety of fishery management and regulation options were evaluated using a postal questionnaire of Tanana River drainage sport fishermen. Anglers rated the quality of interior Alaska fisheries as only average with roadside fisheries receiving the lowest ratings. Over one-third of the respondents *(39* percent) list reasons such as companionship, outdoor enjoyment, and relaxation as primary motivations for fishing. Catch related reasons (i.e. sport and food) were primary motivations for *34* percent and *27* percent of respondents, respectively. Most fishermen approved of stocking new species, stocking more fish, and implementing length limits to improve fishing quality. Reducing bag limits was the least popular regulatory option. Catch and release areas, season closures, and gear restrictions were approved of by *35* to *45* percent of respondents. These options were disapproved of by *32* to *34* percent of respondents with the remainder having no opinion. Differences in use patterns and regulation preferences were found between anglers grouped as sport, food, and nonsuccess-motivated fishermen. Sport-motivated anglers fished more often and preferred length limits and catch and release regulations more than food and nonsuccess-motivated fishermen. Food-motivated anglers were more often rural residents and disapproved of bag limit reductions and catch and release areas and approved of stocking fish more often than sport and nonsuccess-motivated fishermen. Nonsuccess-motivated

fishermen approved of bag limit reductions more frequently than sport and food-motivated fishermen. Such differences in angler groups demonstrate the need for fishery managers to provide a variety of fishing opportunities to meet the needs of a diverse angling public.

INSTREAM FLOW

FDS-23 Instream Flow
by: C. C. Estes

This report summarizes the activities performed during the first year of the Instream Flow program.

Between 1 July 1986 and 30 June 1987, six instream flow analyses were completed. Instream flow reservation applications were submitted to and accepted by the Alaska Department of Natural Resources for the Little Susitna River, Willow Creek, Rabbit Creek, Little Rabbit Creek, Terror River, and Little Survival Creek. To date, the Terror River application has been adjudicated and was granted the requested instream flow reservation, the first in the State. The other applications will probably be adjudicated during FY 88.